

## PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY  
(PCT Rule 43bis.1)

Date of mailing  
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference  
see form PCT/ISA/220

**FOR FURTHER ACTION**  
See paragraph 2 below

International application No.  
PCT/US2005/008231

International filing date (day/month/year)  
11.03.2005

Priority date (day/month/year)  
15.03.2004

International Patent Classification (IPC) or both national classification and IPC  
B01J8/18, C10G11/18, B01J8/24, B01J8/26, B01J19/26

Applicant  
SHELL OIL COMPANY

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



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**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/US2005/008231

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**Box No. I Basis of the opinion**

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1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
  - ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material:
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material:
    - ☐ in written format
    - ☐ in computer readable form
  - c. time of filing/furnishing:
    - ☐ contained in the international application as filed.
    - ☐ filed together with the international application in computer readable form.
    - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No.  
PCT/US2005/008231

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**Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	15,16
	No: Claims	1-14
Inventive step (IS)	Yes: Claims	15,16
	No: Claims	1-14
Industrial applicability (IA)	Yes: Claims	1-16
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

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**Box No. VIII Certain observations on the international application**

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The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability;  
citations and explanations supporting such statement**

1. Reference is made to the following documents:

- D1: US-A-4 778 658 (NIELSEN ET AL) 18 October 1988 (1988-10-18)
- D2: FR-A-2 644 795 (INSTITUT FRANCAIS PETROLE) 28 September 1990 (1990-09-28)
- D3: GB-A-2 085 748 (COAL INDUSTRY LTD) 6 May 1982 (1982-05-06)

**Novelty**

2. In order to discuss novelty, the following must be noted first. The application does not meet the requirements of Article 6 PCT, because claim 1 is not clear.

It is not clear whether the claim relates to a nozzle assembly as such or to a combination of an FCC riser with the nozzle assembly comprised therein, because of the following. Claim 1, which appears to relate to an independent nozzle assembly, describes said nozzle assembly in function of its relationship to a second entity, i.e. the riser, in which it could be located. However, the riser not being part of the scope of the claim. Consequently a lack of clarity arises as to what exactly is the scope of protection sought by the claim.

For the purpose of assessing novelty and inventive step of said claim, its subject-matter was interpreted as relating to independent the nozzle assembly. Accordingly only features describing said assembly have been considered and features describing the relationship or position of said assembly with respect to the second entity have consequently, not been taken into account.

3. The document D1 discloses (the references in parentheses applying to this document) a nozzle assembly according to claim 1 (see Figures 2,3 and other citations in ISR), comprising

- a plurality of feed nozzles (114,152)
- a discharge end (152) of each said feed nozzle for ejecting a mixture of hydrocarbon feed and atomization gas
- wherein the discharge ends of nozzles are canted to one side.

4. Document D2 discloses (the references in parentheses applying to this document) a nozzle assembly according to claim 1 (see Figures 2-5 and other citations in ISR), comprising

- a plurality of feed nozzles (5)
- a discharge end (9) of each said feed nozzle for ejecting a mixture of hydrocarbon feed and atomization gas
- wherein the discharge ends (9) of the nozzles are canted to one side and the other.

5. Document D3 discloses (the references in parentheses applying to this document) a nozzle assembly according to claim 1 (see Figures 1 and other citations in ISR), comprising

- a plurality of feed nozzles (4)
- a discharge end (5) of each said feed nozzle for ejecting a mixture of hydrocarbon feed and atomization gas
- wherein the discharge ends (5) of the nozzles are canted to one side and the other.

6. The subject-matter of claim 1 is therefore not novel over D1, D2 or D3 (Article 33(2) PCT).

7. The subject-matter of dependent claims 2-14 is also disclosed in these documents and therefore not novel (Article 33(2) PCT).

8. The subject-matter of claims 15 and 16 is new with respect to D1, D2, and D3:

The difference of claims 15 and 16 over D1 is the feature that the discharge ends of the nozzles eject the feed directly in the second conduit (72) to contact the regenerated catalyst placed in said second conduit directly at said discharge end. In D1 the nozzles are placed within a separate mixing chamber and are not in direct contact with the second conduit or the catalyst.

The difference over D2 is that the discharge ends of said nozzles, which are parallel to the axis of the second conduit (1), are canted towards the other nozzles and not towards the axis of the second conduit.

The difference over D3 is that the nozzle assembly is placed within an FCC riser. In D3 the nozzle assembly is placed in a fluidized bed for combustion or gasification.

9. The problem to be solved by the present claims 15 and 16 is improving FCC feed nozzle performance and reliability, e.g. of older FCC units, but without the need to change the riser, so as to reduce capital cost.

10. None of the documents D1-D3 disclose or suggest placing the nozzle assembly directly in the second conduit, comprising the catalyst, with the discharge ends of the nozzles canted inwards towards the axis of the second conduit, in order to solve that problem.

The subject-matter of claims 15 and 16 is therefore considered to involve an inventive step (Article 33(3) PCT).

#### **Re Item VIII**

#### **Certain observations on the international application**

The application does not meet the requirements of Article 6 PCT, because claim 1 is not clear. See paragraph 2 above.